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ABDOMINAL TUBERCULOSIS in CHILDREN.

A Thesis for the degree of M.D.,

University of Edinburgh,

by

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ABDOMINAL TUBERCULOSIS in CHILDREN.

A study of nine cases treated by myself in the wards of the Royal Hospital for Sick Children, Edinburgh.

INTRODUCTION.

Abdominal Tuberculosis in children is extremely common. This can easily be gathered from a glance at the following statistics:-¹

Locality and name of Hospital	Period in years	Total Number of in-patients	Percentage of cases of Abdominal Tuberculosis.
London, Great Ormond Street Hospital for Children	10	22,896	1.8
London, North Eastern Hospital for Children	10	10,533	1.3
Birmingham Hospital for Children	10	9,486	1.5
Sheffield Children's Hospital	10	3,400	1.3
Manchester Children's Hospital	9	15,795	2.0
Glasgow Royal Hospital for Sick Children	10	8,619	4.6
Edinburgh Royal Hospital for Sick Children	10	15,320	3.6
Aberdeen Royal Hospital for Sick Children	8	5,379	1.2

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At present a great deal is being done in the way of prevention and treatment of Tuberculosis in the adult. But if we consider that probably most cases of Tuberculosis in the adult have commenced by the tubercle bacillus gaining a footing during infancy, we shall see that by directing our attention to the latter, we are more likely to stamp out the disease.

There is no doubt that the main cause of Abdominal Tuberculosis is to be found in improper feeding during infancy. This is especially so amongst the poorer classes, and it is a well recognised fact that Abdominal Tuberculosis is more common amongst the lower classes. In addition to improper feeding, the hygienic surroundings are usually very bad; but with the aid of Sanitary Inspectors and Medical School Inspection this ought to be remedied. Certainly people are now beginning to understand that fresh air is a "sine qua non" in any form of Tuberculosis.

Any of the abdominal organs may be the seat of Tuberculosis. But I propose confining myself in this Thesis to the consideration of those forms and those localities of Tuberculosis which are by far/

far the most frequent in children. For convenience I will consider them under the three following heads:-

1. Disease of the serous membrane, commonly known as Tuberculous Peritonitis.
2. Disease of the mesenteric and retroperitoneal lymphatic glands, commonly known in its more pronounced form as Tabes Mesenterica.
3. Disease of the alimentary mucous membrane, commonly known as Tuberculous Ulceration of the Intestine.

It is not always possible to draw a hard and fast line, and say that a patient comes under one of the above three divisions, because several patients have the whole three parts affected at one and the same time. However, the above classification will serve as a basis for my remarks.

Under the heading of Tuberculous Peritonitis are included those cases in which there can be clinically detected a general matting of the intestines, or the presence of free fluid in the peritoneal cavity.

By Tuberculous disease of the mesenteric and retroperitoneal lymphatic glands is indicated that/

that group of cases in which we can clinically make out that the said glands are enlarged. It may be necessary to examine the patient under chloroform before it can be definitely stated that the glands are not enlarged.

In Tuberculous Ulceration of the Intestine the main feature is the intractable diarrhoea and wasting.

As the nine cases which I propose discussing were in Dr Melville Dunlop's Ward, Edinburgh Children's Hospital, during the time I acted as his resident, I have to express my gratitude to him for being allowed to make use of them for my Thesis.

PATHOLOGY and MORBID ANATOMY.

Tuberculous Peritonitis can conveniently be divided into two varieties, viz., Plastic and Ascitic, but the difference is only due to the different degree and extent of the inflammatory process.

On post-mortem examination of the early plastic variety, we find the peritoneum covered with small greyish nodules, varying in size from a pin's/

pin's point to a pin's head. They are usually discrete but occasionally confluent. Each tubercle is usually surrounded by a zone of hyperaemia, and there frequently is a blood vessel in the very centre of the nodule. There is usually dulness of the normally shiny surface of the peritoneum and stickiness to the touch, due to the peritubercular exudation, which is sufficient at places to cause adhesion of the adjacent layers. When more lymph is thrown out, we get the more pronounced form of the plastic variety, because this lymph becomes organised, and forms definite bands by which the abdominal viscera are matted together and bound down to the parietes. As the disease progresses these tubercles run together and produce caseous patches of varying sizes. Thus large masses are produced, and the whole of the abdominal contents become matted together, so that it is impossible to unravel the intestines without tearing them. The omentum is sometimes specially affected in this way, and the result is that it becomes shortened and puckered up, and forms a sausage shaped tumour at the level of the transverse colon. Fisher² in his series of eighty post-mortems only found the omentum/

omentum markedly thickened in seven cases, and in only two of these cases was a definite tumour able to be made out.

If the process extends a stage further the caseous nodules break down, with the result that an abscess is formed, and this gives rise to the ulcerous variety which Fisher² mentions in his series. These abscesses sometimes burst into the bowel, when pus may appear in the stools, or the abscess may ulcerate into adjacent coils of intestine, or the adhesions may be so formed that there are localised collections of fluid which give rise to swellings which resemble cysts.

At any of the above stages there may be sufficient fluid thrown out to justify the inclusion of the case under the ascitic variety.

The ascitic variety may be divided into two classes, viz:- (a) that in which the fluid is general in the peritoneal cavity; (b) that in which the fluid is confined to definite loculi by adhesions between coils of intestine. The first variety is more common in acute cases, whilst the second variety usually indicates a chronic process. Fisher² says that fluid may be present in considerable quantity/

quantity at some time during life, but at death general adhesions only are met with. Thus in his eighty post-mortems, forty-eight showed general adhesions, and in only eight of them was there sufficient fluid present to justify their being said to belong to the ascitic variety. The fluid is usually of an olive green colour, but it may be seropurulent or even blood stained.

Regarding the mesenteric and retroperitoneal lymphatic glands, it is worthy of note that they are nearly always implicated in either tuberculous peritonitis or tubercular ulceration of the intestine. The bacilli are absorbed by the lymphatics and carried to the nearest lymphatic gland. Once a gland becomes infected with bacilli it undergoes the usual changes, viz., congestion, swelling, cell proliferation, and caseation, or the process may be arrested at any stage. When the stage of caseation is reached the gland may either become a chronic abscess or by absorption shrink up and become a hard stony mass, and remain quiescent for an indefinite period. This quiescent tubercular focus may at any time be excited into renewed activity. Infection of the general peritoneal cavity may take place/

place from the rupture of one of these chronic abscesses.

Sims Woodhead³ found the mesenteric glands involved in 78.7% of his cases of Tuberculosis in children, and "in fourteen cases the mesenteric glands only were affected, i.e., there was no tubercle found in any other part of the body." Colman⁴ found these glands affected in 66% of his cases. Carr⁵ found them affected in 54%. Dingwall Fordyce⁶ in fifty consecutive post-mortems examined the mesenteric glands and found tubercle bacilli in 20%. Four of these were cases of generalised Tuberculosis; four of Abdominal Tuberculosis; one marasmus; and one of acute endocarditis.

Tuberculosis of the Intestine.

It is rare to find Tuberculosis of the stomach because the tubercle bacillus is generally held to be incapable of developing in the acid gastric juice, but it must be able to survive its action for the ordinary period of gastric digestion. Holt⁷ in 255 post-mortems found tuberculous ulcers/

ulcers in seven cases; but he mentions that this is a larger proportion than usual, and he states that in 131 post-mortems from the Pendlebury Hospital Reports, Manchester, only one case showed Tuberculosis of the stomach. Since the stomach can sometimes be the seat of Tuberculosis, we must assume that it only occurs when there is a deficiency of hydrochloric acid.

The most common part of the intestine to be affected is the small intestine near the region of the ileo-caecal valve. When the large intestine is affected, it is usually the caecum which is affected. The reason why the ileum and caecum are more frequently affected is that here the peyer's patches and solitary glands are more abundant, and in addition the movement of the intestinal contents through this portion is slower than elsewhere, hence the bacilli are caught by these masses of lymphoid tissue. The peyer's patches and solitary glands act in much the same manner as the lymphatic glands do in other parts. Primary infection of the mucous membrane is rare in the adult, but much more common in children. Secondary infection of the intestine/

intestine caused by swallowing tuberculous sputum is much more frequent; and Rolleston⁸ says that over 50% of fatal cases of phthisis show tuberculous ulceration of the intestine. Infection of the mucous membrane of the intestine may be set up by the bacillus being lodged in the wall of the intestine, and there setting up a caseous nodule which goes on to ulceration; or it may occur as a result of the tubercular process extending from the peritoneum. It is curious how often the peritoneum is affected, and yet the mucous membrane remains intact. The tubercles begin in the solitary glands and peyer's patches and eventually break down and open into the intestine, thus forming a small ulcer. Tubercular inflammation is set up in the underlying coats, and in this way the base of the ulcer is thickened and numerous white nodules appear on the peritoneal surface. The edges of the ulcer are raised, thickened, irregular and overhanging, and its longest diameter is at right angles to the intestinal axis. It is rare to get perforation from tubercular ulceration; and it is difficult to be sure that there has been a perforation, because when there are several ulcers/

ulcers there is usually tuberculous peritonitis in addition, and this causes adhesions and matting together of the intestines, so that it is impossible to tell whether we are dealing with a tubercular abscess due to breaking down of a caseous mass in the peritoneum, or due to a perforation of a tubercular ulcer in the intestine. The ulceration may stop at any stage and cicatrization follow. When the ulcers are large there is always a certain amount of narrowing of the gut, but total stricture is very uncommon.

ETIOLOGY.

The discovery of the tubercle bacillus in 1882 by Koch settled the long disputed question as to the cause of Tuberculosis in man. Most medical authorities are agreed that there are two types of the tubercle bacillus, viz., the human and the bovine. The differential characters of the two varieties have been worked out by Weber⁹ under the following heads:-

1. Morphological.
2. Differences in the pathogenetical activities of the bacilli.

Regarding/

Regarding the morphological differences, the human type is long, narrow, and often curved; whereas the bovine type is short, thick, and irregular in outline.

The pathogenetical differences are shown by the fact that subcutaneous injection of the human type into a rabbit produces localised tubercle, whereas the same dose of the bovine type would produce general Tuberculosis. In the case of the guinea pig, an animal which is very susceptible to tubercle, experimenters have found that the guinea pig is less susceptible to the human type; but this difference is only visible when the dose is very small. When the human and bovine bacilli are introduced respectively into the ox, it is found that the bovine type shows a greater virulence than the human type does. This can be proved by injecting into calves a measured dose of bovine bacilli which will produce a fatal result, whereas if the same measured dose of human bacilli be injected into calves, it will be found to produce only local tuberculous lesions. Most observers are agreed that the bovine type is met with in man/

man. The English Commission¹⁰ found the bovine bacillus in 23% of the cultures made from human Tuberculosis, and the German Commission¹⁰ in 10%. Now since the bovine type has been found in man, it follows that either it must have been transmitted, or that both bacilli are the same, and are modified according to the host. The fact of finding bovine bacilli in cultures made from human Tuberculosis disproves the statement made by Koch¹¹ that the bacillus of bovine Tuberculosis was to be considered as practically incapable of transmission to man; and hence we are justified in assuming that milk containing tubercle bacilli is a frequent cause of Abdominal Tuberculosis, especially in children, because milk is their main article of food.

The Channel of Infection.

The recent experiments of Calmette¹² and Guerin¹² change the portal of entrance of the tubercle bacillus from the respiratory tract to the intestinal surface. By means of a catheter they passed, into the stomachs of adult guinea pigs, an emulsion of china ink, and when the animals were killed/

killed their lungs were found to be engorged with carbon particles, whereas the mesenteric glands were free. Their explanation is that the carbon particles pass through the intestinal epithelium, and after passing through the lymphatic glands of the mesentery reach the thoracic duct and are poured into the venous circulation, and finally arrested in the capillaries of the lungs. When a similar experiment was carried out with young guinea pigs they found that the carbon particles were filtered out by the mesenteric glands and that the lungs remained free, whereas the mesenteric glands were deeply injected, - the glands in adult and young guinea pigs acting differently. Those in the young guinea pig are more active and prevent the particles passing through. Sir William Whitla¹³ says that the tubercle bacillus passes through the intestinal mucosa the same as the carbon particles, leaving the mucous membrane intact, but affecting the glands. If this is so, we have one of the main reasons why Abdominal Tuberculosis is much more frequent in children and phthisis much more common in adults. The glands of young children filter out the tubercle bacilli, whereas the glands of adults allow/

allow them to pass through and get into the thoracic duct and thus to the venous circulation, and finally arrested by the lung capillaries. These experiments should be repeated by other observers before their theory can be accepted.

Heredity.

We read of very few cases of prenatal tuberculosis, and the fact that the age incidence of the disease is over five years is against heredity having much effect as far as direct infection is concerned. There is no doubt that the children of tubercular parents are always more likely to become infected when exposed to infection than children of healthy parents. They seem to be much more susceptible to the tubercle bacillus. Amongst my own cases in only one of them was there a family history of tubercle, but too much stress cannot be laid on this fact, because often parents won't admit that there is consumption in their family. The reason that there are several children in one family affected may not be due to lessened immunity from the parents, but to the fact that when one child/

child is exposed to infection probably all the children are exposed to the same infection, and only the most robust of them are able to escape. Koch¹¹ says "though hereditary tuberculosis is not absolutely non-existent, it is nevertheless extremely rare."

Environment.

There is no doubt that environment plays a very great part in the causation of Abdominal Tuberculosis. This will probably account for the fact that it is chiefly amongst the poorer classes that Abdominal Tuberculosis is found. Take the case of "babies in arms" brought up in the slums of our large cities, where the poorer classes are concentrated and overcrowded; where the cubic area per child is below what it should be; and where ventilation is insufficient. Children brought up in these large city tenements seldom escape from a vitiated atmosphere, and scarcely ever have the opportunity of breathing pure fresh air. As a rule children reared in such localities are poorly fed and clad, consequently their constitution is weakened/

weakened in every possible manner, so that when they are exposed to infection their systems are incapable of resisting it. Among the poorer classes where several occupy one room, and where it is common to spit on the floor, when a child begins to walk or crawl it is brought into the very closest connection with one of the most effective means of infection; and further the fact that at this age a child is very apt to put whatever it handles to its mouth, places such a child in a position in which it is scarcely possible to escape infection, if there be any phthisical person in the room.

Considering next the case of a child attending school. He may have a tubercular focus which is quiescent, but the fact of being confined in a school all day lowers his constitution and causes the tubercular focus to become active. Newsholme¹⁴ says "the atmosphere of an average school room is as much fouler than that of the average house of the poor, as is that of a church during a Sunday evening service than that of a middle class house. So far as their life during the day is concerned, the vast majority of children attending schools are under more favourable conditions at home than at school." The above remarks show how injurious/

injurious it is for a child of four years to be sent to school, and this may be one of the reasons why Abdominal Tuberculosis is much more common in this country than it is abroad. For while five years is the age at which a child may be enrolled in a public school, it is undeniable that in many cases mothers, to get the children out of their way, send them to school at an earlier age. In New York, where the percentage of Abdominal Tuberculosis is 0.42 out of 3,082 inpatients in Mount Sinai Hospital,¹ children are not admitted to school till they are six years old, and are not compelled to go till they are eight years. Further the child has to show his birth certificate, so he cannot attend school till he is six years old. In Germany the law prevents parents sending their children to school till they are six and a half years old, and if they are not in good health they are not allowed to enter for another year. Further in Germany the poor widows and mothers of large families receive so much support from public charities that they are not forced to go out and work for their livelihood. Thus they are enabled to stay at home and look after their children. There is no doubt that the latter fact/

fact has a great deal to do with the cause of Abdominal Tuberculosis, because in this country a poor mother has to go out and work for her living, and this necessitates the child being artificially fed. This naturally leads to the question of tuberculous milk.

Since Koch¹¹ in 1901 made the startling statement that the bacillus of bovine tuberculosis was to be considered as incapable of transmission to man, much controversy has taken place among medical men as to whether milk of tuberculous cows was infective or not. The general consensus of opinion seems to discredit Koch's statement; and if we grant that tuberculous milk can cause tuberculosis in human beings, of which there seems to be little doubt, then we have one of the main causes of Abdominal Tuberculosis.

Another point which strikes me on looking over my cases is the number which had some previous infective condition, viz., five out of nine. How often does the mother come with the statement that the child has never been well since it had measles. With regard to measles, it is said that a certain degree/

degree of immunity is conferred as a result of increasing age; and it is well known that schools are the main cause of the spread of measles; therefore if we raised the standard of the age limit for school attendance we would lessen the incidence of measles, and thereby lessen the liability to tuberculosis, because when a child has had measles its whole system is lowered, and even if it has been treated in a fever hospital, it goes home to its old surroundings, which are usually anything but good, with a constitution very much weakened. I have reason to believe that very many children before they develop measles have "latent" tuberculosis, because when I was at the City Hospital, Edinburgh, I tried the Calmette ophthalmo-reaction, and quite a large proportion of them gave a positive reaction. It was quite impossible to try the test in all cases, because in several the eyes were inflamed.

SYMPTOMS and PHYSICAL SIGNS.

In all three conditions the symptoms and physical signs are at the commencement very vague and/

and indefinite. When a child is brought to the hospital or to a physician the mother's statements are vague and various, probably that for the last few months the child has not been thriving; that he is listless and not inclined to run about and play with other children; or that the child is getting very thin, and his appetite is capricious, that "his stomach" is very swollen, and that whereas his bowels used to be quite regular, he has now alternate attacks of diarrhoea and constipation. The latter is the usual history in a case of ulceration of the intestine, and furthermore in this variety the patient frequently complains of attacks of colicky pain. In the very early stages physical examination may reveal nothing - palpation is also negative at this stage. When the condition is well advanced there is the protuberant dome-shaped abdomen standing out in marked contrast to the thin and wasted limbs. The skin of the abdomen is usually glossy, smooth, and traversed by large prominent veins. On palpating a well marked case there can be detected several large masses, which are caused by the intestines being matted together, and on deep palpation several enlarged glands may be felt. But when/

when the abdomen is very distended (the distension being usually caused by flatus or fluid) it is often impossible to make out anything definite. In some cases a definite band can be felt extending from the right flank upwards and to the left. This is caused by the shrunken and shrivelled omentum. Sometimes the first symptom calling attention to the condition is intestinal obstruction, and the true cause of the obstruction may only be diagnosed on the operating table. Or the first symptom may be high fever, drowsiness, and diarrhoea, when the condition is apt to be mistaken for enteric; but I will discuss this later when I come to the question of diagnosis. I will now consider the various symptoms separately.

Onset.

The onset as in all other forms of tuberculosis is usually more or less gradual. The patient to begin with simply feels a little out of sorts, will not take his food well, and is disinclined to play for a day or two, but this soon passes off and the child seems to be quite well again. In a week or so a similar attack occurs and thus the condition progresses with alternate attacks of being/

being well and of being ill, till at last the mother suspects that her child is really ill and brings it to the doctor for advice. The patients are frequently ill for two or three months before the mother seeks advice. In one of my nine cases the illness as stated by the mother was only of ten days' duration, but this must have been a mistake on her part, due to lack of observation or negligence, because the patient only lived twelve days after admission, and on post-mortem examination the peritoneum was studded with tubercles, and there was evidence of a tuberculous abscess having burst, which probably was the cause of the child being brought to hospital, whereas he must have been ailing for a considerable time before the abscess burst. In the other eight cases the children had all been failing in health for at least six weeks before they were brought to hospital.

Pain.

Almost every case at one period or another suffers from a feeling of fulness and uneasiness. Pains of a colicky nature are very frequently caused by undigested food, and are relieved by a dose of castor oil, but the pains of tubercular ulceration are/

are not relieved but if anything aggravated by administration of castor oil. The abdomen is frequently very tender to touch, so much so, that whenever you attempt to palpate, the patient contracts his abdominal muscles making it impossible to diagnose the condition. In four of the nine cases under consideration pain was a marked symptom, whereas in the other five pain was not complained of at all.

Wasting.

Loss of weight is one of the chief symptoms of the disease, in fact, it is frequently the only feature which attracts the mother's attention. In almost no other disease in children do we see so much emaciation. The muscles first of all become very flabby and soft, and then the child gets gradually thinner and thinner till there appears to be no flesh on its bones at all. If a child is gaining weight we can rest assured that the disease is not progressing. In the Edinburgh Children's Hospital infants (i.e., under two years of age) are weighed every second day, and those over two years are weighed once a week. It is surprising how much a patient may gain in a very short time, if it is/

is kept in the open air and the diet regulated. One of my own cases which recovered gained as much as seven pounds in a week. If after being in hospital over a fortnight, a patient does not begin to gain weight, it is usually a bad prognosis, and the reverse also holds good, that a patient who steadily gains weight has a good prognosis. Take the case of R. P. age $1\frac{7}{12}$ years. He weighed 19 lbs. 6 oz. on admission (the average weight for a child of this age being 27 lbs.), and in spite of treatment his weight steadily decreased and he died the twelfth day after admission.

State of the bowels.

Nearly every patient suffers from diarrhoea at some time or other. The stools are pale in colour and frequently very offensive; the former condition is caused by excess of fat in the diet. Frequently the patient has alternate attacks of diarrhoea and constipation. In tubercular ulceration the diarrhoea is uncontrollable, and all treatment seems to be futile. Considering the condition of the bowel this is what we would expect. Styptics at first seem to control the diarrhoea, but the effect is only temporary. In my nine cases only four suffered from diarrhoea. In very young/

young children diarrhoea is frequently caused by improper feeding. Flatulent distension is sometimes present at the commencement of the disease. This was so in seven of my cases, and in only one was the abdomen at all retracted. In the other case the abdomen seemed normal, with the exception of a globular enlargement in the region of the bladder. I will discuss this case more fully later. In none of them was constipation present either before or after admission.

Temperature.

As in all other forms of Tuberculosis, the temperature is a very valuable indication as to how a case is progressing. A case of Abdominal Tuberculosis which is doing well generally has a subnormal temperature. Even in cases which are running subnormal temperatures, we have the typical morning fall with a slight rise in the afternoon. A case which is gradually becoming worse may have two or three days of normal or subnormal temperature, and then the temperature suddenly rises to 100° and next morning it is down to normal and may remain so for a few days, when it again suddenly rises. A case which is running its course rapidly has/

has a continuously intermittent temperature, reaching 102° or so every evening, and coming down to normal next morning. An intermittent temperature like this is always an indication that the disease is progressing, and hence we have to be very guarded in our prognosis. In only one of the nine cases was the temperature never above normal during his stay in hospital. When this patient went home he had gained weight and seemed to be very much improved in every respect. All the other cases had an intermittent temperature during some period of their residence in hospital. Of the two cases which died in hospital the temperature was more or less of the intermittent type the whole time; in neither of them did it ever exceed 102° , which is one of the characteristics of Abdominal Tuberculosis.

Urinary Symptoms.

The quantity of urine passed is usually below the normal. This may be due to the fact that these patients perspire very freely, and it may also be accounted for by the frequent attacks of diarrhoea.

Albumen is said to be frequently found in small/

small quantities, but it was not present in any of my cases. Urates were present when the children were feverish.

The diazo-reaction, which is present in many cases of advanced tubercular infection, may sometimes be positive in Abdominal Tuberculosis, as instanced by one of my cases.

In only one case was painful micturition complained of, and as this is rather interesting I will describe it in full.

F. I. age 2 years.

Father: Wine cellarman.

Complaint: Painful micturition; duration
8 weeks.

Admitted: 22.6.08.

Family History: Father and mother alive and well; no family history of tubercle.

Hygienic Surroundings: Two-roomed house in healthy locality, top flat, plenty fresh air, northern exposure.
Child out daily in open air.

Previous Health: Healthy child, breast fed for fourteen months, afterwards got "what was going." Has had no previous infectious disease.

Present/

Present Illness: Eight weeks ago mother noticed her child was gradually wasting. Patient has till then always taken her food well. During last fortnight patient has had pain on micturition, and sometimes would only pass water once in the twenty-four hours; no blood was noticed in the urine. There is a constant desire to make water, but she is frightened to do so because of the pain.

State on admission: Poor delicate looking child; nutrition poor; no evidence of anaemia, etc. Dry rough skin; one or two palpable glands in the neck.

Thorax: Broad well shaped chest, but very thinly clad, with well marked beading and Harrison's sulcus.

Abdomen: Lower portion full and distended, especially so over region of the bladder. It is slightly tender to the touch over "the tumour."

Respiratory/

Respiratory System)
Circulatory System) Nothing abnormal to note.

Digestive System: Lips pale, tongue clean,
 teeth good, gums healthy, tonsils
 not enlarged, fauces slightly con-
 gested.

Abdomen: Well marked swelling in middle
 line below level of umbilicus.
 Liver and spleen not enlarged.
 Per rectum the bladder is not the
 organ affected. Passed catheter
 and drew off one ounce of urine
 which had no abnormal constituents.

24th Patient was examined under chloroform,
 found large irregular shaped mass, size
 of cocoa-nut extending from symphysis
 to below umbilicus. Gurgling was felt
 under the fingers in front of the mass.
 Mr Carmichael suggested exploring to
 see if there was not some tubercular
 abscess.

27th Patient losing weight and not looking so
 well. Decided to have patient operated
 upon.

2nd/

2nd July Mr Stiles made a small mesial incision above the umbilicus, peritoneum opened, no fluid, intestines presented and were all adherent and covered with small tubercles. A finger was inserted and a hard fixed irregular mass was felt below the umbilicus with no signs of abscess formation. As nothing could be done abdomen was closed with through and through silkworm gut sutures, and horse hair suture for skin edges. Child took anaesthetic well.

3rd Good night. T. 97.6° , P. 104, no sickness, very quiet, looks better.

4th Looks very well, bowels moved, T. 98° .

7th T. 100° , slightly sick, a little abdominal distension, no pain, no tenderness.

8th Sickness stopped, looking better.

9th Very sick to-day, T. 99° .

10th T. 100° , sickness still continuing, pulse very feeble, abdomen becoming very distended.

Died at 9 p.m. No post-mortem allowed.

The condition was evidently one of a tubercular/

tubercular mass pressing on the neck of the bladder causing the painful micturition.

This brings us to the question of pressure symptoms. There may be pressure on the vena cava causing oedema of the lower limbs. Albuminuria may result from pressure on the renal veins. Symptoms of obstruction may be caused by pressure on any portion of the bowel.

None of the other eight cases exhibited any pressure symptoms.

Physical examination.

On looking at a child suffering from Abdominal Tuberculosis, one is struck with the roughness and dryness of the skin all over the body, except over the abdomen which is smooth, shiny and traversed by large prominent veins. The veins appear more prominent than usual because the tubercular masses frequently press on the large veins in the abdomen, and as the abdomen is swollen the skin is stretched, which makes the veins more visible.

The facies is not characteristic in the early stages; but in advanced cases the emaciation is intense, the eyes are sunken and dark, the temples/

temples and cheeks are hollow. The clavicles and ribs stand out prominently. The abdomen is large, rounded, and dome-shaped. The umbilicus is usually flush with the rest of the abdomen, and not retracted as in the normal subject. It may even protrude above the level of the rest of the abdomen.

Palpation.

Very little can be learned by palpation without the assistance of a general anaesthetic, because if you attempt to palpate a child's abdomen, it unconsciously contracts its muscles and renders the whole abdomen rigid. With the aid of chloroform palpation is most useful. In eight of my cases definite masses could be felt, and in the remaining one, which was a case of tubercular ulceration of the intestine, only general resistance could be made out.

All cases should be examined per rectum, because by this means definite masses can often be detected.

Percussion in an ordinary case does not assist much, because the note is tympanitic all over, unless there is free fluid present. In the case of free fluid there is dulness in the flanks, which/

which varies as we change the position of the patient. If there is very little free fluid, it can be detected by putting the patient into the knee elbow position, when there is dulness over the region of the umbilicus. In some cases in which the fluid is encysted by surrounding adhesions the dulness does not shift with the varying position of the patient. If there be a large effusion a distinct thrill may be transmitted through the fluid on flipping the skin of the abdomen.

In none of my cases was the spleen or liver markedly enlarged.

DIAGNOSIS.

The diagnosis in well marked cases is more or less easy, because there is the typical history of failing health for months, and the prominent abdomen with palpable masses.

In early cases the diagnosis is far from easy, and it is at this stage that a correct diagnosis should be made, because then the disease is curable. A great aid to diagnosis is an examination under an anaesthetic. In Dr Melville Dunlop's ward/

ward it is almost a routine practice to give the patient a dose of castor oil in the evening and a simple enema in the morning before the examination. Then the patient is deeply anaesthetised, and in many cases a diagnosis can then be arrived at, because even very small nodules can be detected under chloroform. Even if there are no masses but simply a general matting together of the intestines, we are able to detect a certain amount of resistance which could never be felt without the aid of chloroform. It is also a very good plan to examine per rectum - a practice which could never be satisfactorily carried out in a child unless it were anaesthetised.

Tuberculin has of late proved of great use as an aid to diagnosis and is employed in various methods.

The most useful are:-

1. The cutaneous tuberculin reaction (von Pirquet).
2. The Ophthalmo-tuberculin reaction (Calmette).

The von Pirquet cuti-reaction is the more useful of the two because the technique is so simple and devoid of danger that it is within the reach of the general practitioner.

The/

The method recommended by von Pirquet is to place a drop of tuberculin solution on the skin, and to rub it into an abrasion produced by some blunt instrument. Some prefer to use a sharp pointed instrument, but this is so apt to draw blood I think the former method is better. At the same time a similar abrasion is produced elsewhere, but in this case no tuberculin is rubbed in, and this acts as a control. If the reaction is positive a red papule appears in twenty to thirty hours in the inoculated area and the papule should remain for at least six days. Whereas in the control nothing happens, and even if a papule does appear it does not last longer than 48 hours.

The great advantage of the von Pirquet reaction is that it is extremely delicate, and is capable of detecting a tuberculous condition where no clinical manifestations are present. The severity of the von Pirquet test varies inversely with the severity of the disease, because in very advanced cases it is often negative.

The ophthalmo-tuberculin reaction (Calmette)¹⁵. The method of procedure in this case is to instil into the eye a drop of a $\frac{1}{2}$ per cent. solution of tuberculin/

tuberculin, leaving the other eye free to act as a control. The "reaction", which consists of a characteristic reddening of the conjunctiva, accompanied by lachrymation, and by the formation of a fibrous exudate, commences in six hours, is well marked in 24 hours, and in very severe cases may still be noticeable at the end of a week.

The disadvantages of this test are:-

1. The eye is too delicate an organ to be exposed to any avoidable danger.
2. Patients require constant supervision, hence it is only applicable to hospital patients.
3. If there is any disease of the eye past or present, it is not suitable. Even in a perfectly healthy person there is danger, because if the dose be too large, there is a danger of causing permanent blindness.

The determination of the opsonic index is also a valuable aid to diagnosis. Sir A. E. Wright¹⁶ found that there existed in blood serum a certain substance (which he called an opsonin), which so acted on bacteria that it made them more susceptible to the phagocytes. He also found that every organism has its special opsonin, which is added to the/

the serum as a result of irritation by the special bacterium. The great advantage of Wright's discovery is that we are able to measure the resisting power of the blood to tubercle bacilli. If to a measured quantity of blood serum taken from a person suspected to be tubercular is added a definite quantity of a standardized emulsion of tubercle bacilli and some washed leucocytes, and the mixture is incubated for fifteen minutes at body temperature, it is found that on examining under the microscope the leucocytes have ingested a certain number of the bacteria; by counting the number of bacteria in 100 leucocytes, we shall get the average number of bacteria per leucocyte. If to a similar quantity of blood serum taken from a healthy person is added a similar quantity of standardized emulsion of tubercle bacilli, and after incubating with some washed leucocytes for fifteen minutes at body temperature a count is made of the number of bacteria ingested per leucocyte, we can determine the average number of bacteria ingested in the case of the healthy serum, and the comparison of the two gives us the opsonic index of the suspected person to tubercle. Thus the/

the opsonic index represents the resisting power of the suspected individual as compared with that of a healthy person. The opsonic index to tubercle in healthy people is said to vary from 0.8 to 1.2. Therefore if we suspect a patient to be suffering from Abdominal Tuberculosis and on taking his opsonic index, find it to be below 0.8, we are justified in assuming that our diagnosis is correct, and the reason that his index is low is that he is infected with tubercle and his opsonins are partly used up in acting on the invading organisms. Whereas if the suspected patient has an index above 1.2, it means that an excessive number of opsonins have been produced, which indicates that the patient is infected with tubercle and is resisting strongly or the resisting power is high.

The disadvantage of the opsonic index as an aid to diagnosis is that a few undoubtedly tuberculous people have an index within the limits of the healthy index. One determination of the opsonic index is not conclusive. If the index be estimated on several occasions infection with tubercle may be diagnosed with confidence if the patient's index to the tubercle bacilli is persistently/

persistently low or very irregular. In the latter case the irregularity is due to auto-inoculation.

Examination of the faeces may show presence of tubercle bacilli, especially in cases of tubercular ulceration of the intestine.

Differential Diagnosis.

Chronic dyspepsia is one of the commonest diseases in children to be mistaken for early Abdominal Tuberculosis. The diagnosis between the two conditions is extremely difficult. In both there is the thin anaemic looking child, suffering from constipation and occasional attacks of diarrhoea and sickness. Dr Dingwall Fordyce¹⁷ lays stress on the fact that the tubercular patient can digest large quantities of fat, whereas the dyspeptic only digests fat imperfectly and absorbs very little. The von Pirquet tuberculin test is very useful in this class of case.

The large tympanitic abdomen which occurs in rickets is frequently mistaken for Abdominal Tuberculosis, but in the former there is other evidence of rickets, such as the rickety rosary, the Harrison sulcus, and the enlarged wrists and ankles. Of course tuberculosis may follow or complicate rickets/

rickets.

Enteric fever is one of the diseases which may be mistaken for Abdominal Tuberculosis, because in both conditions there is malaise, headache, sickness, diarrhoea, tumid abdomen, and elevation of temperature. In both there may be a positive diazo-reaction. The distinguishing features are that in Abdominal Tuberculosis the history is usually of longer duration and not so typical as that of typhoid. The temperature chart in typhoid is very characteristic, gradually rising in ladder fashion and remaining elevated for about a fortnight, and then coming down by lysis; whereas in Abdominal Tuberculosis the temperature may reach its maximum in the first two days. In the latter we never have the typical rose red spots. The widal test usually decides the question as to whether the patient has typhoid or not.

Malignant growths in the omentum are frequently mistaken for tubercular masses. Osler says the prolonged subnormal temperature in the tubercular condition goes against the diagnosis of malignancy.

Cirrhosis of the liver causing ascites frequently simulates tuberculous peritonitis, but in the/

the former condition we usually have other evidence of specific disease.

When the glands in the right iliac fossa are affected, the condition may conceivably simulate appendicitis, but the history in the latter is of shorter duration, and the symptoms are more acute; still in some cases a correct diagnosis is only arrived at on the operating table.

PROGNOSIS.

The question of prognosis in Abdominal Tuberculosis is still in a very unsettled condition. Thirty years ago the disease was always considered fatal, but gradually the prognosis has become more and more hopeful till now we may be inclined to look at it from the other extreme. The main factor in prognosis is to consider the statistics of recoveries and deaths. Amongst the nine cases under consideration, three died in hospital, one was a case of tubercular ulceration of the intestine - the prognosis of which is always unfavourable. Four cases died after leaving hospital, one surviving only two days, one two weeks, one five weeks, and the/

the remaining one six weeks. Two of the cases are doing very well. Therefore out of the nine cases we have:-

Cured 2 or 22%.

Died 7 or 77%.

¹⁸
Sutherland in his 41 cases found the following results:-

Recoveries 29 or 70.7%.

Unrelieved 1 or 2.5%.

Deaths 11 or 26.8%.

I know it is not conclusive to form any opinion from so few cases, as I think my death rate is exceptionally high. I have followed the cases for almost two years and the cases which I have classed as cured certainly have no clinical evidence of tubercular disease.

The prognosis of a case depends very much on the temperature. In a child with a subnormal or normal temperature, and no complications, the prognosis is usually good, but if there is occasionally a slight rise we must be more guarded in our prognosis, because this rise in temperature indicates that there is still mischief present, and it only requires a suitable opportunity to render its/

its activity manifest. On the other hand continuous intermittent pyrexia is always an unfavourable sign. Persistent high temperature must also be regarded as unfavourable, because it indicates a mixed infection.

The various conditions which may complicate any of the forms of Abdominal Tuberculosis affect the prognosis very seriously. When there is intractable diarrhoea there is little hope of recovery, because this indicates extensive ulceration of the bowel. Marked emaciation is also a bad sign, because it means that the disease has got the upper hand.

If general miliary tuberculosis is set up the case is hopeless, or even if it become localised to the lungs or the brain the condition is likewise hopeless.

Rupture of a mesenteric glandular abscess may cause death. Guthrie¹⁹ quotes a case in which rupture of such an abscess led to death, through general suppurative peritonitis being set up. Likewise rupture of a tubercular ulcer may cause death.

In spite of my high death rate, I consider that/

that given an uncomplicated case of tuberculous peritonitis or tabes mesenterica, which can be removed to the country and have careful dieting and exposure in the open air, the prognosis is very favourable.

TREATMENT.

Prophylactic Measures.

Table indicating the relative frequency of Tuberculous cases in different Children's Hospitals²⁰

	Number of intern Patients	Number Tuberculous
1906 Belfast Hospital for Sick Children	827	26.10 per cent.
1906 Ulster Hospital for Sick Children	247	30.36 "
1905 Great Ormond Street Hospital, London	2,876	27.00 "
1906 Edinburgh Children's Hospital	1,968	20.00 "
1905 Manchester Children's Hospital	1,999	21.30 "
1905 East London Children's Hospital	2,054	24.30 "
1906 Glasgow Children's Hospital	1,177	27.95 "

From/

From the above table it will be seen that Tuberculosis is common amongst children, and that it is all important that prophylactic measures should be taken to grapple with the disease. In discussing prophylaxis I shall for convenience differentiate between infancy, early childhood, and children of school age.

With regard to infants, I would support the recommendation that the Notification of Births Act²¹ of 1907 be adopted in every district. The main provision of this Act is the notification to the Medical Officer of Health of the birth of every child, within 36 hours. By this means the health visitor for the district could be instructed to visit the child's home, and if its hygienic surroundings are not suitable, or if there is a case of Tuberculosis in the house, she could see that either the child or the infected person was removed. At the same time she could instruct the mother as to the benefits of breast feeding. This leads us to a consideration of how to deal with milk used for artificial feeding. I am convinced that most cases of Abdominal Tuberculosis are caused by the bovine bacillus, and the main source of infection is/

is milk. Therefore in order to stamp out the disease in children, we must first of all stamp out bovine tuberculosis, or prevent the sale of tubercular milk. Professor McFadyean²² says that 30% of the cattle in this country are infected with tuberculosis; therefore it would be a very expensive matter to order that all these cattle should be slaughtered, apart from the fact that if this were done we should probably find that the milk supply was incapable of meeting the demand. But what could and should be done is to impress upon cattle owners that all cattle with udder disease, and other cattle obviously tuberculous, should be killed or separated from the rest of the herd.

In order to prevent the sale of tuberculous milk it is necessary to have a thorough system of inspection. It is mainly cows with tuberculosis of the udder that contaminate the milk; therefore if we made it compulsory to have qualified veterinary surgeons to periodically inspect the cattle in their respective districts, and to apply the tuberculin test to any doubtful animals, and to report any tuberculous animal to the medical officer of health for the district, it would be his duty to see/

see that such animal was slaughtered. Doubtless this would involve expense, but surely when we look at the table showing us the percentage of tubercular children in all our hospitals we see it is essential that some drastic measures should be taken to reduce the number. Dr Anderson²³ suggests the establishment of a milk depôt for the sale of milk specially prepared for infants. This milk to be supplied from a model farm, where the cows, byre and dairy are all treated in the most scientific manner. He says that in addition to supplying pure milk this would educate the public and act as a stimulus to dairymen, because those who had insanitary dairies or did not supply pure and good milk would soon suffer from lack of customers. He adds that the dairymen are at fault, but that the customers are still more at fault, because if they insisted on having pure milk there is no doubt the supply would have to conform to the demand.

Certainly under Section 15 of the Dairies, Cowsheds and Milkshops Order²⁴ it is forbidden to sell or use for human food milk of a cow suffering from tuberculosis, but then many dairymen are quite unaware that their cattle are suffering from tuberculosis/

tuberculosis, whereas if inspection by a veterinary surgeon were compulsory and not optional in all districts few cases would escape detection.

Another very important matter in connection with infant feeding is to impress upon the mother the advantage of boiling the milk. The objection to boiling the milk is that it changes the taste of the milk and destroys some of the natural protective substances in the fluid, but it would be better to ignore these difficulties than use ordinary cow's milk. If parents could be taught how to pasteurise milk a great point would be gained, and a safer and better substitute would be found than boiled milk. In this country in several of the large towns it is possible to buy pasteurised milk at practically the cost of ordinary milk, but as the laity are quite unaware of the danger they run in using ordinary milk, it is difficult to persuade them to buy pasteurised milk. This would be one of the advantages of having lady health visitors to instruct the mothers in these matters. The Directors of the Edinburgh Children's Hospital have recently appointed a lady visitor to superintend the carrying out of instructions/

instructions in the patients' homes.

In France they have *crèches* situated quite near to several of the large factories, where the mothers can go and suckle their children, without stopping their work for more than the time necessary to feed their children. In this way the mothers are enabled to work regularly and yet bring up their children on the breast. In this country no such places exist.

The principal danger for children over two years is that of becoming infected by tuberculous members of the family. This brings us to the question of notification. In Scotland in 1906 the Local Government Board sanctioned the addition of pulmonary phthisis to the list of compulsory notifiable diseases, provided the local authority was prepared to take definite steps to try and prevent the spread of the disease. The great advantages of compulsory notification are that the medical officer of health knows where the disease exists, and can either have the patients removed to a suitable hospital, or instruct the patients regarding the disposal of sputum and the necessary precautions to be taken against the spread of the disease/

disease. One of the disadvantages of classing phthisis as an infectious disease is that all the contacts become subject to the disabilities under the Public Health Act 1907. Another serious disadvantage is the expense entailed. Dr Squire²⁵ suggests compulsory notification but voluntary administrative regulations for prevention.

With regard to school children, the subject has to be considered from two points of view:-

1. There is the question of dealing with the children already infected with Tuberculosis.
2. There is the danger to children attending school who are quite free from Tuberculosis but are liable to become infected through contact with tuberculous children.

With regard to tuberculous children, it would be of immense value to have open air schools in which they were regularly fed and received their instruction in the open air. In Charlottenburg in Germany they have a forest school for 214 children, at which the children are fed daily and educated in the open air. In 1907 London opened their first open air school in Postall Wood, and next year they established three others in Kentish Town, in Horniman/

Horniman Park and on Shooter's Hill. They are also talking of having one in connection with Paddington Dispensary. In Scotland at the present time no such schools exist. Here again the expense stands in the way of the cure. But since so much has been done for adults by means of sanatoria, it is hoped that when its value is realised, means may be found to do something for school children on the lines of sanatoria schools. Meanwhile much might be done for tuberculous children by providing vacation colonies where they could be sent into the country or to homes at the sea coast for six weeks or more every year. The Children's Holiday Fund Organization has certainly done a great service in this direction by enabling hundreds to be sent into the country every year.

Medical inspection of school children, if properly carried out, should greatly lessen the spread of Tuberculosis amongst school children. At present although it is optional in Scotland there are few School Boards who have not appointed medical school officers. But we must go further than medical inspection; it is not sufficient to have diagnosed the patient to be tuberculous; we must/

must follow it to its home and see that all its surroundings are hygienic, and impress upon the parents the advantages of fresh air, clean clothing, and good nourishing food, and if possible have the child sent to an open air school. Another very important point is to see that the teachers themselves are quite free from Tuberculosis, and it may be permissible to hope that this end will now be attained, since every student is examined twice by a medical officer - once when he enters as a junior student, and once when he enters as a student in training.

Tuberculous Dispensaries can do a great deal to prevent the spread of Tuberculosis. In Edinburgh Victoria Dispensary the visiting physician and the nurse pay special attention to the children in the houses they visit. They see that the non-tuberculous are separated from the others, and that the tuberculous children are prevented from attending school, and are advised to be kept in the open air as much as possible.

Medical Treatment.

It is essential that the intestines be kept/

kept as much at rest as possible. The nourishment should be in a concentrated form, so as not to distend the digestive organs, and of such a kind to leave very little residue. By this means the peristaltic action will be reduced. The diet must consist mostly of proteids and fats and scarcely any carbohydrates. The latter cause fermentation and leave a large undigested residue which stimulates peristalsis both by mechanical irritation and the tension produced from its bulk. The diet given in Dr Melville Dunlop's ward is as follows:-

Breakfast: Lightly boiled or poached egg,
cocoa made with milk, toast thickly
buttered.

11 a.m. Cup of milk or beef tea or raw
meat juice.

Dinner: Minced meat or pounded fish with
crumbled toast or rusk (no potatoes
allowed), custard and stewed fruit
with plenty of cream, no farinaceous
puddings allowed.

3 p.m. Cup of milk.

Tea: Same as at breakfast time.

After/

After dieting, the next most important thing is plenty of fresh air. In Dr Melville Dunlop's ward these patients live out in the open air night and day. They sleep in the ward for the first two nights and then they are put out on the balcony and remain there night and day for the remainder of their stay in hospital. Under this treatment they soon begin to improve. Their desire for food increases and the fresh air seems to help to reduce the temperature. All these patients get cod liver oil in some form or another. If their bowels are loose petroleum emulsion seems to be better borne than the pure oil. In the Edinburgh Children's Hospital at the commencement they get small doses of calomel (1/12th grain ter in die). This acts as an intestinal antiseptic, reduces fermentation, and thus lessens the peristalsis. As anaemia frequently complicates the condition, small doses of Syrupus Ferri Iodidi are given. In this preparation we have the effect of the iodide as well as the iron. It is also a routine practice in Dr Melville Dunlop's ward to have the patient's abdomen massaged with a 5 per cent. ointment of oleate of mercury. Burney Yeo²⁶ advises/

advises a mixture of equal parts of iodoform ointment and cod liver oil to be rubbed over the abdomen twice daily, and a pill containing $\frac{1}{4}$ grain iodoform and $\frac{1}{2}$ minim of creasote to be given internally thrice daily. By this means he believes the fluid in the peritoneal cavity becomes charged with iodine compounds which act as antibacterial to the bacilli. Firm abdominal strapping by plaster or a flannel bandage is recommended by Knox²⁷ and Caesar²⁸ as a means of promoting absorption of free fluid in the peritoneal cavity. Knox²⁷ suggests that the strapping acts as a support to the abdominal muscles and presses the fluid up towards the diaphragm, where there are numerous lymphatics, and as a result of the strapping thoracic respiration and aspiration are increased. Therefore the fluid is more readily absorbed.

In Guy's Hospital the linimentum hydrargyri is spread over the surface of a flannel bandage which is stretched tightly round the abdomen.

At Paddington Green Hospital most of the cases are treated by mercurial inunction, and the results are said to be satisfactory.

Carmichael²⁹ recommends massage with guaiacol and/

and lanolin as being better than mercurial inunction. He thinks that massage is more efficacious than laparotomy in stimulating absorption of fluid.

Christopher Heywood³⁰ found great benefit from the use of arsenic. The form he advised was a combination of the bromide of gold and bromide of arsenic.

Carpenter³¹ advised hypodermic injection of 1/30th grain of perchloride of mercury once a day and said he found it successful in several cases.

Treatment with the various tuberculins is at present in the experimental stage, but in the near future it will, I think, be one of the most useful adjuncts to treatment. The opsonic index of a healthy person to tubercle lies between 0.8 and 1.2. Patients with an index below 0.8 usually suffer from localised tuberculosis, and those with an index above 1.2 generally suffer from tuberculosis accompanied by symptoms of general disturbance. The injection of suitable quantities of tuberculin raises the tuberculo-opsonic power of the blood; therefore it is mainly in localised tuberculosis that tuberculin is of most value.

Clive/

Clive Rivière³² says that the administration of tuberculin to a patient suffering from Tuberculosis accompanied by symptoms of general disturbance - i.e., one with a high opsonic index - should theoretically be made worse, but in practice this is not so. He says that "under tuberculin the opsonic power is steadied though it rises no higher, "and striking improvement in the general and local "symptoms often takes place." He considers tubercular peritonitis one of the most suitable forms of Tuberculosis for tuberculin treatment. The doses he advises are as follows:-

For a child of one year 1/12000 to 1/8000 of a
milligramme of T.R.

"	"	five years 1/4000	"	"
"	"	ten or twelve years 1/3000	"	"

He recommends that these doses be varied according to the opsonic index and that they should be repeated every two weeks according to the progress of the case.

Dingwall Fordyce¹⁷ considers the determination of the opsonic index unnecessary in cases of Abdominal Tuberculosis. He thinks the temperature is a satisfactory guide as to the initial administration, and the dose to be increased according to the/

the general clinical condition. He considers that if the patient seems to lose ground after an injection, that that is an indication to either lessen the dose or increase the interval between the succeeding doses. He maintains that the child after each injection should continue to improve or the dose is at fault. He found oral administration very unsatisfactory. The doses he advises hypodermically vary from 1/10000 of a milligramme to a child of 9 months to 1/3000 of a milligramme to a child of twelve years. Nathan Raw³³ says that tuberculin is an absolute specific in cases of tuberculous peritonitis where the disease is limited to the abdomen.

The two following cases are examples of tuberculin treatment which have come within my knowledge although they were not under my personal treatment:-

Case I. J. S. W. age 17 years.

Complaint: Pain and swelling of abdomen.

Duration: Five weeks.

State on admission: Several large glands felt in the abdomen.

Date/

<u>Date</u> 1910	<u>Inoculated</u>		<u>Remarks</u>
Jan. 12	1/15000 milligramme	T.R.	Weight 8 st. 12 lbs.
" 19	1/12000	"	Doing very well. Weight 9 st.
" 26	1/10000	"	Weight 9 st. 1 lb.
Feb. 2	1/8000	"	" 9 st. 2 $\frac{3}{4}$ lb.
" 9	1/8000	"	Abdomen examined; nothing abnormal. Weight 9 st. 2 $\frac{1}{2}$ lb.
" 16	1/8000	"	" 9 st. 2 $\frac{3}{4}$ lb.
" 23	1/8000	"	Doing very well; no pain; abdomen not enlarged.

Case II. G. B. age 15 years.

State on admission: Several enlarged glands in abdomen; dulness at both apices.

<u>Date</u> 1909	<u>Inoculated</u>		<u>Opsonic Index</u>	<u>Remarks</u>
Sep. 15	1/15000 milligramme	T.R.	.79	
" 22	1/15000	"		
" 29	1/12000	"		Chest examined and dulness disappeared.
Oct. 20	1/15000	"		
" 27	1/12000	"		
Nov. 3	1/10000	"	1.32	
" 10	1/10000	"	0.98	Much improved; putting on weight; started work.
" 17	1/10000	"		
" 24	1/10000	"		
Dec. 1	1/10000	"		Still gaining weight.
" 8	1/10000	"		Doing very well.
" 15			1.06	
" 22	1/12000			Very much improved; abdomen examined; no glands felt.

Regarding the treatment of tubercular ulceration of the intestine, our first consideration must be to control the diarrhoea. Careful dieting in this form is also of very great importance. The diet must be nourishing, easily digested, and free from all irritating ingredients. Fluids are better than solids, and milk, which is the most nourishing fluid food, should be given freely along with raw meat juice. Of drugs, bismuth and opium are the most useful, the bismuth being given in doses of two to ten grains every two hours, and opium in the form of Dover's powder 1/10th grain every two hours. Various astringents such as lead, tannin, gallic acid, and silver nitrate are recommended, but they seem to have only a temporary effect.

Surgical Treatment.

The value of surgical treatment in Abdominal Tuberculosis was discovered accidentally about fifty years ago. The first case was operated upon for some supposed tumour, but when the abdomen was opened a large quantity of fluid escaped, and the peritoneum was studded with myriads of tubercles, so/

so the operation was not proceeded with. The abdomen was again closed up and from that day the patient made an uninterrupted recovery. This mistake was frequently made, and as recovery frequently followed the laparotomy, it was recommended as a method of treatment in all cases of tuberculous peritonitis. König³⁴ reports that 84 out of 131 cases were apparently cured by this means. Watson Cheyne³⁴ says that in practically all cases where improvement does not follow medicinal treatment in six weeks, the abdomen should be opened whether there be ascitic fluid or not. He holds that favourable results have been obtained from laparotomy even in the "dry" form. Several theories such as the action of light, of air, the removal of the fluid, the formation of adhesions, have all been set forth as the reason why simple laparotomy is so beneficial. Probably the reason why the mere removal of fluid is so beneficial is that the fluid which is removed is poor in opsonins and other protective substances, and after its removal fresh fluid is thrown out which contains more antibacterial substances than the fluid withdrawn. Thus the tubercular foci are surrounded by
a/

a fresh fluid of higher opsonic content.

Aldibert³⁵ recommends laparotomy in all cases accompanied by ascites; in suppurative cases which are diffuse or with a unilocular cyst; in cases of obstruction caused by adhesions or pressure from glands; and all cases where the diagnosis is doubtful. He says that laparotomy is contra-indicated in the fibrous form not accompanied by pain; in the dry ulcerative forms; in the suppurative forms with multilocular cysts. His statistics are out of 52 operations 45 recoveries and 7 deaths.

In 1902 Guthrie³⁶ and Sutherland¹⁸ expressed the view that the benefits of surgery in Abdominal Tuberculosis had been much overrated. Of cases treated at Paddington Green Hospital they found the death rate under surgical measures was 50%; whereas the death rate under medical treatment was only 16%.

Recently surgical treatment has not been so commonly practised, but is now coming to the fore again. This time it is a question of operation to remove tubercular mesenteric glands. But the mesenteric glands should only be removed if the disease/

disease is confined to them - i.e., it has to be regarded as primary in the mesenteric glands. If there is tubercular ulceration of the intestine or any other source of infection, there will be no advantage in removing the mesenteric glands, because we would not be getting at the seat of the disease. In one of my cases which I have previously detailed in full, Mr Carmichael advised operation in the hope that an abscess or mass of enlarged glands might be removed, but when Mr Stiles operated he found the abdomen riddled with tubercle, the intestines all adherent, and no evidence of an abscess, so he did not proceed further.

Some surgeons recommend operation in cases of tubercular ulceration of the intestine, hoping to be able to excise the ulcer, but this seems unreasonable, because it is very rare to find only one ulcer, and it is impossible to diagnose the number of ulcers present.

BRIEF SUMMARY of CONCLUSIONS.

1. Abdominal Tuberculosis is a very common disease in Edinburgh and Glasgow.
2. The bovine bacillus is capable of causing Tuberculosis in man, and is more frequently found than the human type in cases of Abdominal Tuberculosis.
3. The chief source of infection is tubercular milk, and contact with tuberculous patients.
4. The intestine is the main channel of infection in cases of Abdominal Tuberculosis.
5. Heredity plays a very small part in the causation of the disease.
6. Environment is a very important factor, both in relation to cause and cure.
7. The leading symptoms and signs in a well marked case are enlarged abdomen, progressive cachexia, abdominal pain, capricious appetite, alternate attacks of diarrhoea and constipation, intermittent temperature, several palpable masses, or the presence of fluid in the peritoneal cavity.
8. The greatest aids to diagnosis are examination under chloroform and the von Pirquet tuberculin reaction.

9. Prognosis in uncomplicated cases is good, provided the necessary treatment can be carried out. Prognosis in cases of tubercular ulceration of the intestine is very unfavourable.
10. Regarding the treatment of the first two varieties, careful dieting and fresh air are of prime importance; drugs are of secondary importance, but of drugs the most useful are massage with oleate of mercury, and carefully regulated doses of tuberculin.
- In tubercular ulceration of the intestine, treatment by drugs is of very little use in well established cases.
- Surgical treatment is very useful in the ascitic variety, if the fluid does not lessen after two months of medical treatment.

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